

STUDY OF CASES OF THYROID DISORDER HYPERTHYROIDISM AND HYPOTHYROIDISM

AUHOOD KADHIM ZAID

Department of Chemistry, College of Science, University of Thi-Qar, Iraq

ABSTRACT

This study included the to identify the two cases thyroid disorders by measuring the levels of thyroid hormones. The study included three groups, the first group (I) included 20 healthy volunteers were taken as a standard (control group), second group (II) 30 patients with hyperthyroidism, the third group (III) 30 patients with hypothyroidism. The results showed the presence of a significant increase($p < 0.01$) in the levels of triiodothyronine (T3) and Thyroxine (T4) in group(II) compared with the control group, While, the results recorded a significant decrease($p < 0.01$) in level of thyroid stimulating hormone(TSH) in group(II) compared with the control group. The results indicated a significant decrease($p < 0.01$) in levels of triiodothyronine (T3) and Thyroxine (T4) in group (III) compared with the control group, Also, The results indicated a significant increase($p < 0.01$) in level of thyroid stimulating hormone(TSH) in group (III) compared with the control group.

KEYWORDS: Thyroid Disorder, Hyperthyroidism, Hypothyroidism

INTRODUCTION

The thyroid gland is one of the largest of the endocrine glands, that is located in the front of the neck . The thyroid gland produces thyroid hormones. These are peptides containing iodine. The two most important hormones are tetraiodothyronine (thyroxine or T4) and triiodothyronine (T3). These hormones are essential for life and have many effects on body metabolism, growth, and development. (Larsen *et al*, 1998)

Thyroid hormone production is regulated by another hormone called thyroid-stimulating hormone (TSH). TSH is made by the pituitary gland, TSH travels to the thyroid where it stimulates the production of T3 and T4 and their release into the bloodstream (Klein, 1990; Poupour *et al*, 1994).

The state of normal thyroid function is called **euthyroidism**. Abnormalities of the thyroid gland are common and affect 1-5% of the population. The main causes of thyroid disease are increased thyroid hormone production or **hyperthyroidism**, and decreased thyroid hormone production or **hypothyroidism** (Little *et al*, 1997; Harjai and Licata, 1997).

Hyperthyroidism occur more in women than in men (Wendy, 2007). Graves' disease is the most common cause of hyperthyroidism, which means the body's immune system acts against its own healthy cells and tissues (Arthur and John, 2006; Tariq *et al*, 2010).

Hypothyroidism is an underactive thyroid gland, common causes are autoimmune disease, surgical removal of the thyroid, and radiation treatment. (Burtis *et al*, 2006; Birte, 2010).

The current study included a study of thyroid disorders by measuring thyroid hormones triiodothyronine (T3), Thyroxine (T4) and thyroid stimulating hormone (TSH).

MATERIALS AND METHODS

Selection of Subjects

This study was carried on 20 donor healthy and 30 patients in the center of Diabetic and Endocrine Gland specialization in Thi-Qar governorate, Iraq. They are classified into three groups:-

Group I: control group included 20 donor healthy with ages ranged between 20 and 50 years old, with no previous diseases which may interfere with parameters analyzed in this study.

Group II: This group involved 30 patients they have been previously diagnosed hyperthyroidism by the doctor.

Group III: Included 30 patients they have been previously diagnosed hypothyroidism by the doctor.

Hormone Analysis

About (3 mL) of blood samples of patients with hyperthyroidism and hypothyroidism and controls were taken and allowed to clot to get serum by putting it in empty disposable tube's centrifuge to separate it in the centrifuge at 3000 rotor per minute (*rpm*) for 10 min, the serum samples were separated, stored at (-20°C) for later measurement biochemical parameters, unless used immediately.

Thyroxine (T4), triiodothyronine (T3) and thyroid stimulating hormone (TSH) is an automated quantitative test (Vidas company, France) for use on the VIDAS instruments, for the enzyme immunoassay determination of human T4, T3 and TSH in human serum or plasma (lithium heparin ate) using enzyme linked fluorescent assay (ELFA) technique (Beckers, 1982; Helfand and Crapo, 1990; Biersack and Hotze, 1991; Wondisford *et al*, 1996).

Statistical Analysis

The data were analyzed using **SPSS** version 10.0, the results were expressed as mean \pm standard deviations (mean \pm SD). One way ANOVA-test was used to compare parameters in different studied groups. P-values ($P \leq 0.01$) were considered statistically significant. (Sabine and Brian, 2004).

RESULTS

Table 1 showed a significant increase ($p < 0.01$) in levels of triiodothyronine (T3) and thyroxine (T4) hormones in patients with hyperthyroidism (group II) compared with control group (group I), While, the results recorded a significant decrease ($p < 0.01$) in levels of triiodothyronine (T3) and thyroxine (T4) hormones in patients with hypothyroidism (group III) compared with group (I), Also, there was a significant decrease ($p < 0.01$) in level of thyroid-stimulating hormone (TSH) in patients with hyperthyroidism (group II) compared with control group (group I), While, the results recorded a significant increase ($p < 0.01$) in level of thyroid-stimulating hormone (TSH) in patients with hypothyroidism (group III) compared with group (I). The results indicated a significant decrease ($p < 0.01$) in levels of triiodothyronine (T3) and thyroxine (T4) hormones in patients with hypothyroidism (group III) compared with group (II), While, the results recorded a significant increase ($p < 0.01$) in level of thyroid-stimulating hormone (TSH) in patients with hypothyroidism (group III) compared with group (II).

Table 1: T3, T4 and TSH Hormones Levels (Nmol/L) of Groups

Treatments	n	T3 Level (nmol/l)	T4 level (nmol/l)	TSH Level (nmol/l)
Group I	20	3.03±0.27 ^b	101.45±13.49 ^b	2.82±1.27 ^b
Group II	30	5.26±1.14 ^a	194.08±47.63 ^a	0.212±0.216 ^c
Group III	30	0.99±0.70 ^c	37.76±14.11 ^c	4.402±1.954 ^a

N: Number of subjects

DISCUSSIONS

Thyroid dysfunctions that occur in pregnant and postpartum women, during fetal development, and in childhood are caused by the abnormal secretion of thyroid hormones. The medical conditions include hyperthyroidism and hypothyroidism (Woeber, 2000). The causes of hypothyroidism were varied, usually caused by dietary lack, but sometimes caused by improper assimilation, radioactive iodine that causes follicle destruction, surgery and pharmacological agents (Vanderpump *et al*, 1995; Singer *et al*, 1995).

Laboratory testing of thyroid stimulating hormone levels in the blood is considered the best initial test for hypothyroidism; a second TSH level is often obtained several weeks later for confirmation. Levels may be abnormal in the context of other illnesses, and TSH testing in hospitalized people is discouraged unless thyroid dysfunction is strongly suspected

(Cobin *et al*, 2012; Pearce, 2012) An elevated TSH level indicates that the thyroid gland is not producing enough thyroid hormone, and free T4 levels are then often obtained. Measuring T3 is discouraged in the assessment for hypothyroidism. Many cases of hypothyroidism are associated with mild elevations in creatine kinase and liver enzymes in the blood. They typically return to normal when hypothyroidism has been fully treated. Levels of cholesterol, low-density lipoprotein and lipoprotein (a) can be elevated; the impact of subclinical hypothyroidism on lipid parameters is less well-defined (MacIsaac and Grossmann, 2012; Klubo-Gwiedzinska and Wartofsky, 2012).

Hyperthyroidism, often called overactive thyroid and sometimes hyperthyreosis, is a condition in which the thyroid gland produces and secretes excessive amounts of the free (not protein bound circulating in the blood) thyroid hormones triiodothyronine (T3) and/or thyroxine (T4). (Biondi and Cooper, 2008).

Measuring the level of thyroid-stimulating hormone (TSH), produced by the pituitary gland (which in turn is also regulated by the hypothalamus's TSH Releasing Hormone) in the blood is typically the initial test for suspected hyperthyroidism. A low TSH level typically indicates that the pituitary gland is being inhibited or "instructed" by the brain to cut back on stimulating the thyroid gland, having sensed increased levels of T₄ and T₃ in the blood. In rare circumstances, a low TSH indicates primary failure of the pituitary, or temporary inhibition of the pituitary due to another illness (euthyroid sick syndrome) and so checking the T₄ and T₃ is still clinically useful.

Measuring specific antibodies, such as anti-TSH-receptor antibodies in Graves' disease, or anti-thyroid-peroxidase in Hashimoto's thyroiditis a common cause of hypothyroidism may also contribute to the diagnosis.

The diagnosis of hyperthyroidism is confirmed by blood tests that show a decreased thyroid-stimulating hormone (TSH) level and elevated T4 and T3 levels. TSH is a hormone made by the pituitary gland in the brain that tells the thyroid gland how much hormone to make. When there is too much thyroid hormone, the TSH will be low.

(Geffner and Hershman, 1992; Hall, 1994).

CONCLUSIONS

Results indicated a relationship thyroid disorders with levels of thyroid hormones. Hyperthyroidism is characterized by a high level of T3, T4 and low level TSH hormones. While hypothyroidism is characterized by low level of T3, T4 and high level TSH hormones.

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